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Perceived oral health and oral health behaviours among home-dwelling older people with and without domiciliary care

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Abstract

Objectives: The aim was to compare the perceived oral health and oral health behaviours of home-dwelling older people with and without domiciliary care.

Background: Oral health is poor in long-term care, but less is known about perceived oral health of home-dwelling older people receiving domiciliary care.

Materials and methods: Data from the Health 2000 and Health 2011 surveys (BRIF8901) were used. Interview participants were at least 70 years old and living at home with or without domiciliary care (n = 1298 in 2000 and n = 1027 in 2011). Differences in perceived oral health (subjective oral health, pain, eating difficulties) and oral health behaviours (hygiene, use of services) were compared based on the use of domiciliary care and stratified by gender. Differences between groups were compared with the chi-square test.

Results: In 2011, compared to non-clients, domiciliary care clients more often had poor subjective oral health (40.3% vs. 28.9%, $P = .045$). In both surveys, they also used oral health services less recently (2000, 76.4% vs. 60.9%; and 2011, 61.1% vs. 46.6%) and more often had difficulties chewing hard food (2000, 50.6% vs. 34%, $P < .001$; and 2011, 38.4% vs. 20.7%, $P < .001$) than non-clients. In 2000, clients had more difficulty eating dry food without drinking (39.5% vs. 21.6%, $P < .001$) and cleaning their teeth and mouth (14.3% vs. 1.1%, $P < .001$) than non-clients. Women clients in 2011 brushed their teeth less often than non-clients (43.5% vs. 23.7%, respectively, $P = .001$).

Conclusion: Domiciliary care clients have poorer perceived oral health, and greater difficulties with eating and oral hygiene maintenance than non-clients.

KEYWORDS

domiciliary care, home dwelling, older people, oral health

1 | INTRODUCTION

While the population is ageing, the need for domiciliary care increases.[1] Domiciliary care aims to enable older people to overcome functional and health limitations to live at home. Demand for domiciliary care has increased, while demand for long-term care has decreased.[2]

In Finland, around 1% of the total population (5.5 million) received regular domiciliary care services, with 77% of domiciliary care clients

in 2018 being over 75 years old.[3] The number of domiciliary care clients is expected to increase with the ageing of the population.[4] Finnish domiciliary care services are publicly funded, but providers can be public or private organisations and are mostly for older people who require assistance in their daily routines.[5,6] The care services provided are based on the assessment of individual service needs,[7] for example health and medical services, catering, cleaning assistance and daily care provisions. Yet, oral health is frequently neglected in caring and nursing, including domiciliary care.[8-10]

Support for maintaining good oral health (cleaning teeth, mouth, dentures and regular use of oral healthcare services) is required among older people, as the need for aid increases when functional capacity decreases.[11,12] Older people are increasingly retaining more of their own teeth,[13] increasing the risk of oral diseases[14] and bringing new challenges in maintaining oral health with or without assistance.[11,15] Care dependency and frailty of older people have also been connected to lower oral health-related quality of life and oral health behaviour.[16,17] Poor oral health can lead to various complications, as poor oral health has been found to be associated with cardiovascular diseases,[18] pulmonary infections,[19] systemic infections,[20] diabetes,[21] lower life expectancy[22,23] and poor nutrition intake.[24,25] Oral health-related quality of life (OHRQoL) also decreases along with non-regular oral health service use,[26] poor oral health and tooth loss.[23,25,27-29]

Oral health is not routinely assessed during domiciliary care planning,[10] and domiciliary care clients with functional limitations have poorer oral health.[30] Previous studies have focused on the clinical aspect regarding the oral health of home-dwelling older people, with fewer studies examining the perceived or oral health behaviour of domiciliary care clients.[30-32] More knowledge is needed on perceived oral health and the oral health behaviours of home-dwelling older people with and without domiciliary care. This study aimed to compare the perceived oral health and oral health behaviours of home-dwelling older people who receive domiciliary care and those who do not use data from two national cross-sectional surveys in 2000 and 2011.

2 | MATERIALS AND METHODS

This study is a secondary analysis of the nationally representative Health 2000 and Health 2011 surveys (BRIF8901).[33-36] The Health 2000 survey was conducted in 2000-2001 by the National Public Health Institute of Finland (KTL),[33] and the Health 2011 survey was conducted in 2011 by the Finnish Institute for Health and Welfare (THL former KTL).[34] The main sample for the Health 2000 survey included 10,492 adults, aged 18 years or over.[35] The Health 2000 survey participants were re-invited to participate in the Health 2011 survey.[36] Both surveys investigated participants' health, function and well-being. Sampling was based on a two-stage stratified cluster, strata were university hospitals (n = 5) and clusters were health centres (n = 80). A representative sample of over 18-year-old Finns was randomly selected. Along with interviews, the original data were also collected by questionnaires, laboratory tests and health examinations. In 2000, structured interviews using validated questionnaires were conducted by professional interviewers of Statistics Finland and, in 2011, by trained nurses; the latter also evaluated interviewees' ability to response.[33-36] Permission and ethical approval for the Health 2000 and Health 2011 surveys were granted by the Ethical Committee for Research in Epidemiology and Public Health at the Hospital District of Helsinki and Uusimaa (HUS). All participants provided informed and signed consent. If a participant had health or cognitive limitations, the oral consent of a participant was signed by a family member or a relative.[33-36] For this study, the utilisation of data was permitted by the Finnish Institute for Health and Welfare (THL).

Participants were eligible for this study if, in the year 2000 or 2011, they were 70 years or older and living at home with or without domiciliary care services. Participants living in care homes, or with missing information about living circumstances or use of domiciliary care service, were excluded from the study (n = 140 (Health 2000) and n = 540 (Health 2011), respectively). Participants who took part in the interviews of the Health 2000 (n = 1298) and Health 2011 (n = 1027) surveys were included in the analyses. The education background of participants was based on the validated question of the highest attended school level.[33,34] In this study, the education background was dichotomised as low (less than primary school, primary school or secondary school) and middle/high (grammar, comprehensive or high school or matriculation examination). The utilisation of domiciliary care services in 2000 and 2011 was determined from self-reported responses to the Health 2000 and Health 2011 survey questions. The first question was "Do you receive repeated assistance or help in your everyday activities (for example household work, washing up, shopping) because of your reduced functional capacity?" with yes or no response alternatives. The following question was asked if a positive response was given, "Have you received help from a home care assistant or a nurse?". Those who responded having received help from a home care assistant or nurse were categorised as domiciliary care clients, and those who did not receive help or received help from family members, relatives or friends were categorised as non-clients.

The questions included in this study with their response alternatives are presented in Table 1. Improvements based on analyses of the Health 2000 survey were made for the Health 2011 survey.[34] Hence, different questions were asked of dentate and edentulous persons in the two survey years. In 2000, only visits to dentists were asked, while in 2011 visits to a dentist, dental hygienist, dental assistant or dental technician were included (Table 1). Ability to clean one's own teeth and mouth without assistance (categorised as no difficulties/difficulties or not able) was asked only in 2000.

Descriptive statistics were calculated for perceived oral health (subjective oral health, toothache or other troubles, difficulties in eating or chewing) and oral health behaviours (cleaning teeth, mouth and dentures, and use of oral health services). Data were analysed by gender and utilisation of domiciliary care services. Stratification was conducted by gender as women use oral healthcare services

TABLE 1 Characteristics of home-dwelling participants aged 70 years or older with or without domiciliary care, and their perceived oral health and unmet dental treatment need, use of dental services and oral health behaviours

	Health 2000					Health 2011				
	n	Domiciliary care (n = 264)	No domiciliary care (n = 1034)	p[a]	All	n	Domiciliary care (n = 86)	No domiciliary care (n = 941)	P[a]	All
Gender										
Men	436	25.1	38.3	0.001	36.7	424	15.9	41.2	0.000	38.8
Women	862	74.9	61.2		63.3	603	84.1	58.8		61.2
Education										
Low	983	80.3	74.3	0.091	75.2	613	77.5	63	0.006	64.4
Middle/high	309	19.7	25.7		24.8	405	22.5	37		35.6
Missing	6					9				
Is the condition of your teeth and the health of your mouth at present?										
Good/rather good	691	51.8	55.1	0.435	54.6	621	59.7	71.1	0.045	70.0
Satisfying/rather poor/poor	58	48.2	44.9		45.4	261	40.3	28.9		30.0
Missing	24					145				
Do you have removable dentures?										
Edentulous with or without complete dentures	737	71.8	50.5	<0.001	53.8	288	45.2	33.0	0.027	34.1
Dentate with removable dentures	299	14.9	26.1		24.3	260	31.5	28.5		28.8
Dentate without removable dentures	259	13.2	23.4		21.8	337	23.3	38.5		37.1
Missing	3					142				
Have you during the past 12 months had toothache or other trouble related to your teeth or dentures?										
Yes	295	18.3	24.4	0.079	23.4	249	26.4	28.5	0.703	28.3
No	999	81.7	75.6		76.6	633	73.6	71.5		71.7
Missing	4					145				
Are you able to chew hard or tough food, such as rye bread, meat or apple?										
No difficulties	774	49.4	66.0	<0.001	63.4	690	61.6	79.3	0.001	77.7
Some difficulties or cannot chew	480	50.6	34.0		36.6	194	38.4	20.7		22.3
Missing	44					143				
Are you able to eat dry bread or biscuits without drinking liquid at the same time?										
Yes	927	60.5	78.4	<0.001	75.7					
No	321	39.5	21.6		24.3					
Missing	50									

(Continues)

TABLE 1 (Continued)

	Health 2000					Health 2011				
	n	Domiciliary care (n = 264)	No domiciliary care (n = 1034)	p[a]	All	n	Domiciliary care (n = 86)	No domiciliary care (n = 941)	P[a]	All
Do you think you need dental treatment now?										
Yes	401	27.5	34.4	0.080	33.3	401	31.5	39.4	0.147	38.6
No	867	72.5	65.5		66.7	621	68.5	60.6		61.4
Missing	30					5				
When did you last visit a dentist in 2000/visited dental care in 2011?										
Less than 12 months ago	440	23.5	39.1	<0.001	36.7	545	38.8	53.4	0.007	52.1
1-2 years ago	135	11.4	10.8		10.9	167	12.9	16.7		16.3
3-5 years ago	125	6.6	10.1		9.6	95	14.1	9.4		9.8
Over 5 years ago or never	577	58.4	40.0		42.8	208	34.1	20.5		21.7
Missing	21					10				
How often do you usually brush your teeth? (among dentate only)										
At least twice a day	299	44.9	54.5	0.202	53.5	549	51.4	63.1	0.048	62.0
Once a day or less often	258	55.1	45.5		46.5	335	48.6	36.9		38.0
Missing						143				

Note: Data are based on subset of nationally representative Health 2000 and Health 2011 surveys.

[a] chi-square test

more often,[37] have better subjective oral health[38] and brush their teeth[35] more often than men. The chi-square test was used for comparing differences in perceived oral health and oral health behaviours between domiciliary care clients and non-clients, also stratified by gender. The statistical significance level was set at $P < .05$. The survey-specific weighting coefficients were used to correct effects of oversampling in older age groups and non-response. The data analysis was conducted with IBM SPSS 25 software (IBM Corporation, Chicago, IL, USA).

3 | RESULTS

The median age of all Health 2000 survey participants was 78 (70-99) years, being 83 (70-95) years for domiciliary care clients and 74 (70-99) years for non-clients. In the Health 2011 survey, the median age was 77 (70-100) years for all participants, with 83 (70-97) years for domiciliary care clients and 75 (70-100) years for non-clients. Domiciliary care clients were 20.3% of the participants in 2000 and 8.4% in 2011. In both surveys, most domiciliary care clients were women, and the majority of all participants had low education background. (Table 1).

Domiciliary care clients reported poorer subjective oral health in 2011, more often having difficulties eating dry food without drinking liquids in 2000, and difficulties chewing hard food in 2000 and 2011, than non-clients. In 2000 and 2011, domiciliary care clients were also more often edentulous. Furthermore, domiciliary care clients in both surveys had used oral healthcare services less recently, and in 2011, they brushed their teeth less often than twice a day than non-clients. (Table 1) There were no considerable differences in accumulation of difficulties in eating and chewing or toothache or other problems among those using domiciliary care services or among those who did not (data not shown).

In 2011, male domiciliary care clients ($n^{2000} = 60$ and $n^{2011} = 17$) reported more often having difficulties chewing hard food and had used oral healthcare services less recently, than non-clients (Table 2). In 2000, they had toothache or other problems less frequently, and were more often edentulous, than non-clients ($n^{2000} = 376$ and $n^{2011} = 407$).

In both surveys, women with domiciliary care reported more often poorer subjective oral health, difficulties chewing hard food and were also more often edentulous than non-clients. In 2000, they had more difficulty eating dry food without drinking liquids than those without domiciliary care. Female clients had used oral

TABLE 2 Characteristics of home-dwelling men aged 70 years or older with or without domiciliary care, and their perceived oral health and unmet dental treatment need, use of dental services and oral health behaviours. Data are based on subset of nationally representative Health 2000 and Health 2011

	In 2000					In 2011				
	n	Domiciliary care (n = 60)	No domiciliary care (n = 376)	P[a]	All	n	Domiciliary care (n = 17)	No domiciliary care (n = 407)	P[a]	All
Education										
Low	320	79.1	73.1	0.403	73.8	226	64.3	57.3	0.607	57.6
Middle/high	115	20.9	26.9		26.2	197	35.7	42.7		42.4
Missing	1					1				
Is the condition of your teeth and the health of your mouth at present?										
Good/rather good	225	42.5	54.3	0.155	53.1	251	66.7	66.3	0.981	66.4
Satisfying/rather poor/poor	204	57.3	45.7		46.9	126	33.3	33.7		33.6
Missing	7					47				
Do you have removable dentures?										
Edentulous with or without complete dentures	214	65.9	45.3	0.034	47.5	103	41.7	27.5	0.560	28.0
Dentate with removable dentures	112	18.2	26.8		25.9	116	25.0	31.4		31.1
Dentate without removable dentures	110	15.9	27.9		26.6	158	33.3	41.2		40.9
Missing						47				
Have you during the past 12 months had toothache or other trouble related to your teeth or dentures?										
Yes	323	13.6	27.9	0.043	26.4	115	16.7	30.9	0.292	30.4
No	112	86.7	72.1		73.6	262	83.3	69.1		69.6
Missing	1					47				
Are you able to chew hard or tough food, such as rye bread, meat or apple?										
No difficulties	268	50.0	64.9	0.053	63.2	291	53.8	78.5	0.037	77.5
Some difficulties or cannot chew	162	50.0	35.1		36.8	86	46.2	21.5		22.5
Missing	6					47				
Are you able to eat dry bread or biscuits without drinking liquid at the same time?										
Yes	110	76.8	65.1	0.091	75.6					
No	317	34.9	23.2		24.4					
Missing	9									
Do you think you need dental treatment now?										
Yes	284	32.6	33.8	0.870	33.7	175	35.7	41.4	0.673	41.2
No	139	67.4	66.2		66.3	248	64.3	58.6		58.8
Missing	13					1				

(Continues)

TABLE 2 (Continued)

	In 2000					In 2011				
	n	Domiciliary care (n = 60)	No domiciliary care (n = 376)	P[a]	All	n	Domiciliary care (n = 17)	No domiciliary care (n = 407)	P[a]	All
When did you last visit a dentist in 2000/visited dental care in 2011?										
Less than 12 months ago	163	22.7	40.4	0.067	38.5	230	33.3	54.9	0.008	54.0
1-2 years ago	48	13.6	10.2		10.6	74	0	17.9		17.2
3-5 years ago	55	9.1	12.5		12.1	34	20.0	7.5		8.0
Over 5 years ago or never	168	54.5	36.8		38.9	84	46.7	19.7		20.8
Missing	2					2				
How often do you usually brush your teeth? (among dentate only)										
At least twice a day	89	20.0	41.4	0.102	39.9	170	25.0	45.4	0.163	44.7
Once a day or less often	132	80.0	58.6		60.1	252	75.0	54.6		55.3
Missing						47				

Note: [a]chi-square test

healthcare services less recently in 2000, and in 2011, they brushed their teeth less often than twice a day (Table 3).

Domiciliary care clients reported in 2000 more often having difficulties in being able to clean their teeth or mouths independently than non-clients (14.3% vs 1.1%, $P < .001$). A similar difference was observed in women (13.3% vs 0.8%, $P < .001$) and men (16.7% vs 1.6%, $P < .001$), respectively. In 2000, no statistically significant difference was observed between participants with or without domiciliary care in cleaning removable dentures.

4 | DISCUSSION

In this study, domiciliary care clients more often reported having poorer perceived oral health and having difficulties chewing hard food and eating dry food without drinking liquids than non-clients. Clients were more often edentulous and had poorer oral health behaviours in terms of less recent use of oral healthcare services and brushing teeth, and poorer ability to clean their teeth or mouths themselves, than non-clients. Women receiving domiciliary care not only were more often edentulous but also had chewing difficulties than those without domiciliary care.

According to a previous national study, subjective oral health among older Finnish adults has improved.[38] However, in a longitudinal study among Finnish adults, less regular use of dental services has been shown to lead to poorer subjective oral.[26] In the current study population, subjective oral health was reported to be poorer with the utilisation of oral health services being less frequent among domiciliary care clients. More frequent use of dental services in 2011 might have resulted from improved accessibility of oral health services. However, domiciliary care clients likely encounter greater difficulty in the use of oral health services.

The more frequent difficulties chewing hard food among domiciliary care clients in this study are likely related to their poorer health, limited functional capacity and that they were more often edentulous than non-clients. Differences in the use of dental services[39] might also have an effect, especially as domiciliary care clients had poorer subjective oral health. This is further supported by the finding that older people without domiciliary care more often had natural teeth than those who needed domiciliary care services. Tooth loss and eating difficulties can lead to poor nutrient intake[20,21] and affects life expectancy.[18,19] The condition of, and need for, removable dental prostheses ought to be always considered when planning domiciliary care services for older people.

Dry mouth is common among domiciliary care clients.[32] Inability to eat crackers without drinking has been considered as one indicator for hyposalivation.[40] In this study, difficulty eating dry food without drinking liquids was often reported, especially among female domiciliary care clients. This may be related to the medications taken by the participants.[32] Given impaired health is a key reason for the need of domiciliary care, domiciliary care clients are likely to have poorer health and take more medications than older people without domiciliary care.

The poorer oral health behaviours of domiciliary care clients seen in this study could be partly explained by their cognitive and functional limitations,[11,12,15,16,30] and their requirement for support.[10]

TABLE 3 Characteristics of home-dwelling women aged 70 years or older with or without domiciliary care, and their perceived oral health and unmet dental treatment need, use of dental services and oral health behaviours. Data are based on subset of nationally representative Health 2000 and Health 2011

	In 2000					In 2011				
	n	Domiciliary care (n = 204)	No domiciliary care (n = 658)	P[a]	All	n	Domiciliary care (n = 69)	No domiciliary care (n = 534)	P[a]	All
Education										
Low	663	80.6	75.0	0.180	76.1	387	79.7	66.9	0.027	68.6
Middle/high	194	19.4	25.0		23.9	208	20.3	33.1		31.4
Missing	5					8				
Is the condition of your teeth and the health of your mouth at present?										
Good/rather good	466	54.8	55.6	0.868	55.4	370	58.3	74.6	0.008	72.5
Satisfying/rather poor/poor	379	45.2	44.4		44.6	135	41.7	25.4		27.5
Missing	17					98				
Do you have removable dentures?										
Edentulous with or without complete dentures	523	73.8	53.9	<0.001	57.6	185	45.9	37.1	0.069	38.2
Dentate with removable dentures	187	13.1	25.7		23.4	144	32.8	26.5		27.3
Dentate without removable dentures	149	13.1	20.4		19.1	179	21.3	36.4		34.5
Missing	3					95				
Have you during the past 12 months had toothache or other trouble related to your teeth or dentures?										
Yes	183	22.2	19.8	0.559	21.7	134	27.9	26.7	0.847	26.8
No	676	80.2	77.8		78.3	371	72.1	73.3		73.2
Missing	3					98				
Are you able to chew hard or tough food, such as rye bread, meat or apple?										
No difficulties	506	49.2	66.7	<0.001	63.5	399	62.9	79.9	0.003	77.7
Some difficulties or cannot chew	318	50.8	33.3		36.5	108	37.1	20.1		22.3
Missing	38					96				
Are you able to eat dry bread or biscuits without drinking liquid at the same time?										
Yes	610	58.8	79.3	<0.001	75.7					
No	211	41.2	20.7		24.3					
Missing	41									
Do you think you need dental treatment now?										
Yes	262	25.8	34.6	0.056	32.9	226	31.1	37.9	0.255	37.0
No	583	74.2	65.4		67.1	373	68.9	62.1		63.0
Missing	17					4				

(Continues)

TABLE 3 (Continued)

	In 2000					In 2011				
	n	Domiciliary care (n = 204)	No domiciliary care (n = 658)	*P*[a]	All	n	Domiciliary care (n = 69)	No domiciliary care (n = 534)	*P*[a]	All
When did you last visit a dentist in 2000/visited dental care in 2011?										
Less than 12 months ago	277	24.2	38.2	0.006	35.7	317	39.4	52.5	0.143	50.9
1-2 years ago	87	10.5	11.0		10.9	93	15.5	15.6		15.6
3-5 years ago	70	6.5	8.7		8.3	61	14.1	10.8		11.2
Over 5 years ago or never	409	58.9	42.1		45.1	124	31.0	21.1		22.3
Missing	19					8				
How often do you usually brush your teeth? (among dentate only)										
At least twice a day	210	52.9	64.1	0.204	62.8	379	56.5	76.3	0.001	73.7
Once a day or less often	126	47.1	35.9		37.2	128	43.5	23.7		26.3
Missing						96				

Note: [a]chi-square test

However, the support needed is often not regularly carried out by those providing domiciliary care.[10,41] This study highlights the importance of constructing guidelines on how oral hygiene measures should be recognised in daily domiciliary care.

The study population is a representative sample of Finnish home-dwelling older people (70 years or older), which is a strength of the study.[33-36] However, the drop-out and missing information on domiciliary care are limitations. Those who participated in the Health 2000 survey were invited to take part in the Health 2011 survey. The lower proportion of male domiciliary care clients, especially in 2011, can likely to be attributed related to the lower life expectancy of men. Reduction in the domiciliary care clients between 2000 and 2011 in this study is uncertain, nationally a slight decrease in the percentage of domiciliary care clients aged 75 and over between 2000 and 2011[3]; and in this study, the proportion of domiciliary care clients in 2011 was lower than that found nationally.[3] Possible reasons for this could be, first, that some participants might have moved to long-term care facilities in the period between surveys. Second, the health of participants aged from 70 to 81 years ("new" participants) may have been better in 2011 than in 2000. Third, the reduction may be due to changed criteria for domiciliary care between 2000 and 2011. Additional limitation is the self-reported nature of domiciliary care and missing data. In 2011, over 500 participants were excluded as information about their use of domiciliary care services was missing. Analyses were attempted to determine whether those with missing information on home care differed according to oral health-related variables; however, 95%-99% of them also had missing information on oral health-related variables. This may have been due to their poor functioning or that they were cared for by relatives instead of receiving domiciliary care.

It should be noted that an analysis for this study started in 2019. Despite two previous studies,[10,41] there was still a lack of information on perceived oral health and oral health behaviours among home-dwelling older people with and without domiciliary care. Hence, the Health 2000 and Health 2011 surveys provided important national-level data about home-dwelling older people that was not available elsewhere.

In the Health 2000 survey, when asked about having removable dentures, several cases were reported as edentulous without complete dentures. Consequently, these participants were not asked follow-up questions that concerned the use of dental services and maintaining of oral hygiene for example.

This study provides new, nationally representative information about perceived oral health and oral health behaviours among home-dwelling older people with and without domiciliary care. While the study findings can be generalised to Finnish domiciliary care, they may also be applicable to countries with similar domiciliary care systems. For further research, a clinical study among domiciliary care clients would provide valuable information on their oral health status, which could then be compared with their perceived oral health.

5 | CONCLUSION

The lower functional ability, poorer perceived oral health and impaired oral health behaviours among domiciliary care clients highlight the importance of considering oral health care in domiciliary care.

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The Finnish Institute for Health and Welfare (THL), former the National Public Health Institute (KTL), conducted the Health 2000 and Health 2011 surveys. The surveys were partially supported by the Finnish Dental Society Apollonia and the Finnish Dental Association.

CONFLICT OF INTEREST

No conflicts of interest are applicable on behalf of the authors.

AUTHOR CONTRIBUTIONS

All authors were responsible for conception, design and interpretation of the data. Statistical analyses were conducted by R. Salmi and A. Suominen. R. Salmi was the main contributor in writing of the manuscript, and T. Närhi, A. Suominen, A-L. Suominen and S. Lahti critically revised the manuscript. A-L. Suominen was also responsible for data acquisition. All authors gave full approval for the manuscripts and are accountable for all aspects of the work.

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